



Additional remarks on the  
Brown Report 1774-18  
Royal College of Surgeons  
13401/12228502  
MAY 21 2015  
me ID b22285027  
TRACTS 32100  
Vo. (SIS) a44122

Supplementary Observations on the Fer-  
deæ and Asclepiadæ. By ROBERT

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Mogensen  
from the New York

*Supplementary Observations on the Fecundation of Orchideæ and Asclepiadeæ.* By ROBERT BROWN.

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ORCHIDEÆ.

IN the observations appended to my Paper on these two Natural Families, printed in the 16th Volume of the Linnean Society's Transactions, and which relate entirely to Orchideæ, it is stated, that in several species of Ophrydeæ the Tubes, produced either directly from the grains of Pollen, or in consequence of their application to the Stigma, were found spread over the surface of the Placentæ, and not unfrequently inserted into the aperture of the Ovula. The correctness of this statement I have confirmed, during the present season, by numerous observations, not only on the same, but also on several other species. Another remarkable appearance observed in some of these species, especially in *Orchis ustulata*, *fusca*, *Morio*, and in *Ophrys apifera*, and which indeed I had before met with, but neglected to mention in my Paper, consists in the elongation and protrusion of the jointed or cellular filament connecting the upper extremity of the Embryo with that of the original nucleus (the Tercine of M. Mirbel).

The Filament so protruded often equals the whole Ovulum in length, and its elongation seems to depend not only on the enlargement of each of the cells or joints, of which the included thread consists, but also on the production of additional joints.

As, however, the Pollen tube is found applied to the aperture of the Ovulum uniformly before either the Embryo or its thread is distinguishable, and as I have never observed the protruded thread of the Ovulum until after the secondary nucleus or Embryo, of which it is a continuation, becomes visible, I consider it as a production subsequent to impregnation.

It is possible, therefore, that the nearly similar tubes which have been observed terminating, as it is supposed, the nucleus of the unimpregnated Ovulum in a few other Families, may in some of these cases be of like origin.

To the observations formerly made on the general structure of Orchideæ, I have here to add,—

1st, That the cells of the testa of the ripe seed are frequently spirally striated, though these cells in the Ovulum before and even for some time after impregnation are absolutely without striæ.

2nd, The Fibrillæ constituting the pubescence frequently produced, and in some cases entirely covering the surface of the aërial roots, as they have been called, of the parasitical portion of the Order, is very remarkable.

These Fibrillæ, which I have examined both in dried and recent specimens of several species, but more particularly in the living state in *Renanthera coccinea*, are simple tubular hairs without joints, and whose apices, by which they adhere when attached to other bodies, are either of the same diameter, or somewhat dilated; and then, as in *Renanthera*, often more or less lobed.

In their natural state they exhibit, in most cases, hardly any indication of spiral structure; but the membrane, of which they entirely consist, is sufficiently elastic to admit of being extended, and at the same time unrolled, to about twice the length of the Tube. They then form a broad ribbon of equal width throughout, and spirally twisted from right to left,—a direction opposite to that which generally obtains in spiral vessels. It is possible that this may not be the direction of the spire in all cases: it is manifest, however, very generally, if not universally, in *Renanthera*.

The existence of spiral tubes produced on the surface is probably of very rare occurrence; and among Phænogamous plants I have hitherto met with it only in the hairs of the inner surface of the Corolla of some species of *Ceropegia*, in the wool enveloping the spines in several species of *Mammillaria* and *Meloeactus*, and in the Coma of the seed of an Apocynous plant from Brazil: for the spiral vessels in the seeds of *Collomia*, first observed by Mr. Lindley, and described by him as external, are seated between the two membranes of the testa, as I have long since described those of *Casuarina*. They differ, however, in direction; being in *Collomia* transverse or perpendicular, while in *Casuarina* they are longitudinal, or parallel to the membranes.

#### ASCLEPIADEÆ.

With regard to this Family, it was remarked, both in the Pamphlet which was distributed in the beginning of November 1831, and in my Paper in the Transactions of the Linnean

Society, published in 1833, that I had never been able to find the Pollen tubes descending lower than the commencement of the ovuliferous portion of the Placenta. But as this was far from satisfactory, especially after the further course of the analogous Tubes in Orchideæ had been ascertained, I determined to re-examine the subject.

For this purpose *Asclepias phytolacoides* was selected; and on the 12th of the present month I succeeded in tracing the Pollen tubes in that species, not only over the whole ovuliferous surface of the Placenta, but also going off to the Ovula, to a definite point of each of which a single Tube was found in many cases attached.

These observations I have now so frequently repeated, and always with results so exactly similar, that I have great confidence in the correctness of the following statement.

In the newly expanded flower, the Ovulum in *Asclepias phytolacoides* is nearly obovate, and is compressed in the same direction as the ripe seed, but in a much less degree: its umbilical cord is inserted on the axis of the inner or ventral side, about one fourth from the apex, and a process proceeding from it is continued, though not very distinctly, to the opposite or lower extremity. On the upper and broader end of the Ovulum a deep groove is observable, commencing at its inner margin, which is nearly in contact with the Placenta, and extending through its whole breadth, and somewhat obliquely downwards, so as to terminate at the same height on the outer side of the Ovulum with the upper edge of the ventral umbilical cord. This groove, or that point of it to which the Pollen tube is attached, occupies the place of the Foramen so generally found in the unimpregnated ovulum of Phænogamous plants. In *Asclepias phytolacoides*, however, and I believe the observation may be extended to every species of the genus, there is certainly no perforation, nor at this period are the coats and nucleus of the Ovulum separable or even distinguishable; and the same apparent simplicity of structure is found even in its earlier stages.

Soon after the Pollen tubes enter the cavity of the Ovarium, even before the Corolla falls off, they may be found spread over the whole ovuliferous surface of the Placenta, which then often becomes of a light brown colour, but never dark brown or black, like the upper non-ovuliferous portion. From the surface of the Placenta the Tubes go off, one to each Ovulum, along the depressed apex of which the Tube passes till it reaches the outer extremity of the groove, where it is invariably inserted. To this point the Tube adheres so firmly, that I am inclined to think it actually penetrates, to some depth at least, into the

substance of the Ovulum; a fact, however, which I have not yet absolutely ascertained.

Soon after the insertion of the Pollen tube, a change takes place in the appearance of the Ovulum, an internal body or nucleus becoming visible, with the upper attenuated extremity of which the point of insertion accurately corresponds.

The Pollen tube, when thus inserted into the Ovulum, is not always absolutely destitute of granules; in some cases containing a few, which in size and form seem to be identical with those that completely fill it in its nascent state. But as such granules, at the period of insertion, are either very few in number, or apparently altogether wanting, I am still inclined to consider them rather as furnishing the nourishment of the Tube than as being the essential agents in fecundation; the really active particles in this function being probably much more minute.

These supplementary observations may be concluded with the remark, that although the descent of Tubes derived from the Pollen into the cavity of the Ovarium, and their insertion into that point of the Ovulum where the Radicle of the future Embryo is seated, has been absolutely ascertained in several species of Orchideæ and in one of Asclepiadeæ, and probably will be found in the whole of these two extensive families, yet it does not follow that this descent and insertion of Tubes should be expected to extend to all Phænogamous plants; for among these some structures of the female organ exist, which hardly admit of this œconomy.

London, July 31st, 1833.



